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ABSTRACT

A study determined whether chemical operations specialists at skill level 1 differ in terms of aptitude, job knowledge, job confidence, and perceptions of task difficulty, task importance, task frequency, and task training, depending on whether the specialists are active U.S. Army soldiers or are in the Army Reserve. The subjects for whom complete data were obtained were 151 active soldiers selected from 6 units and 152 reserve soldiers selected from 9 reserve units at 12 different locations. Data collection involved obtaining scores on the Armed Services Vocational Aptitude Battery as recorded in each subjects' personnel file and the administration of the following instruments: (1) Chemical Operations Specialist Skill Level 1 Job Knowledge Test with a demographic cover sheet; (2) Chemical Operations Specialist Skill Level 1 Job Confidence Survey; and (3) Chemical Operations Specialist Skill Level 1 Task Survey. Discriminant analysis was the statistical technique used. The following results were reported: (1) the active Army soldiers had significantly higher composite scores than the Army reservists in all aptitude areas assessed; (2) the two groups did not differ significantly on the variables job confidence and perceptions of task training; (3) the active Army specialists had significantly higher scores on the measures of job knowledge and perceptions of task frequency than did the reservists; and (4) the reservists had significantly higher scores on perceptions of task difficulty and task importance. (A 12-item bibliography is included.) (CML)

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# ACTIVE ARMY AND ARMY RESERVE SOLDIERS: A COMPARISON

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## Abstract

An analysis of the differences between active army and army reserve chemical operations specialist Skill Level 1 soldiers on selected variables was conducted. Subjects were 303 chemical operations specialist Skill Level 1 soldiers, 151 of whom were active army and 152 were army reserve. The purpose of the study was to determine if the two groups differ in terms of aptitude, job knowledge, job confidence, and perceptions of task difficulty, task importance, task frequency, task training.

Active army chemical operations specialist Skill Level 1 soldiers were found to have significantly higher composite scores than the army reserve chemical operations specialist Skill Level 1 soldiers in all aptitude areas as assessed by the Armed Services Vocational Aptitude Battery. The two components did not differ significantly on two of the six variables, job confidence and task training. They did differ significantly on the remaining four variables with active army soldiers having higher scores on job knowledge and task frequency and army reserve soldiers having higher scores on task difficulty and task importance.

The U.S. Army operates the largest educational and training system in the country. In fiscal year 1985, over 135,000 soldiers were trained in over 379 military occupational specialties to serve in either the active army, army reserve, or army national guard (Department of the Army, 1986). Training, or education, (these terms being used interchangeably in the military) of these soldiers involves 17 U.S. Army service schools under the direction of the U.S. Army Training and Doctrine Command. Each school is the central authority and thereby responsible for a specific area within the military such as infantry, armor, signal, or chemical.

The U.S. Army Chemical School at Fort McClellan, Alabama, is the proponent for all training dealing with the nuclear, biological, and chemical aspects of warfare. The staff of the U.S. Army Chemical School is responsible for the design, development, and implementation of a unified nuclear, biological, and chemical curriculum which is taught to all soldiers: active army, army reserve, and army national guard at both the chemical school and within the individual units. The U.S. Army Chemical School curriculum is divided into programs of instruction for the total force, designed for both active and reserve components. Based on these programs, instruction is designed, developed, and implemented by the staff and faculty of the U.S. Army Chemical School at Fort McClellan, Alabama, for the training of chemical operations specialists. These programs of instruction are the resulting product of a systems approach to training which includes five phases: analysis, design, development, implementation, and evaluation (Department of the Army, 1988).

In the analysis stage, a description of the target population is developed which is used as the basis for instructional design (Department of the Army, 1975; Department of the Army, 1988; Gagne, 1977).

Currently, all programs of instruction are developed based on a target population of active duty military personnel. Unique differences which may exist between the active duty military and reserve component personnel have not been identified or addressed. Prior to 1973, this problem was not significant. In that year, however, the members of the U.S. Congress restricted the size of the active army to 781,000 soldiers. To keep our military position viable, a new concept, Total Force, was implemented. We now consider the reserve components as well as active duty soldiers when preparing for our national defense. Upon declaration of a national emergency, army reserve or army national guard units may be activated. These elements would "round out" the active force. To ensure the capability of such a force, these reserve component units are held accountable in meeting the same standards in training as active component units.

The reserve components consist of both the army national guard and the army reserve units which in 1988 made up 56% of the total army force. The army national guard, which has existed since 1836, is the modern counterpart of the colonial minutemen with a strength of 452,000 personnel. The guard fulfills dual responsibilities as assigned by the constitution to both the state and the federal government. State responsibilities consist of helping in civil emergencies. Their federal responsibility is

wartime mobilization. Army reserve units were established in 1908 as backup forces directly linked to the active army. Currently 314,000 strong, the army reserve is responsible only to the federal government. Both the national guard and the army reserve typically train 1 weekend per month plus 2 weeks each summer. These civilian-soldiers spend the majority of their time pursuing civilian occupations with less than 300 hours per year devoted to military training (Jennings, 1988).

Chemical soldiers in the army reserve components (generic term encompassing both U.S. Army Reserve and Army National Guard) receive initial entry and advanced individual training at Fort McClellan, Alabama (Department of the Army, 1983). Additional training takes place through the army reserve schools and the national guard academies. Programs of instruction designed and developed at the U.S. Army Chemical School are used by these organizations. The curriculum of the U.S. Army Chemical School is determined by the Department of Defense through the Training and Doctrine Command. Based upon many factors such as the recognized threat, doctrine, manpower, and equipment available, a determination is made of the skills and abilities required to perform specific jobs in wartime.

This curriculum must then be translated into instruction. To facilitate this translation, in-depth analyses are conducted to ensure that the training is appropriate for the needs and abilities of the intended population. All training is designed and developed by the U.S. Army Chemical School personnel based on the total concept: that is, all chemical operations specialist soldiers should be trained in the same tasks to the same

performance standards using the same instructional methods and products whether they are members of the active army or of an army reserve component.

Military education is unique in that actual training requirements are stated in terms of tasks which are taught to an absolute rather than relative standard (Department of the Army, 1979; Mager & Pipe, 1979). In the army training system, some tasks are designated to be trained in the school setting while others are designated to be trained in the unit. The decision of where to train, school or unit, is made after careful consideration of factors such as frequency of performance, immediacy of performance, consequence of inadequate performance, and availability of facilities.

The purpose of service school training is to ensure that the initial basic mastery of the critical tasks, skills, knowledge, and abilities required by each duty position is achieved by the soldier. The purpose of the active duty unit and the reserve unit is to train critical unit-specific tasks and to reinforce school-trained critical tasks.

Training materials used for training in the unit as well as school-reinforcement training materials are developed, packaged, and delivered by U.S. Army Chemical School personnel to the active army unit and the reserve component units in an effort to assure consistency of training throughout the chemical corps. While time constraints are considered in the design and development of exportable training packages, other significant factors such as target audience differences in aptitude are not considered. Nor

are job confidence, job knowledge, and the perceptions of task difficulty, task importance, task frequency, and task training included in the design of training materials. This omission could impact upon the effectiveness of training and increase the time and cost of training. According to Gilbert (1978), "The best tactics for reducing the true time and costs of training are identical to those required to improve its effectiveness" (p. 278).

This study was undertaken to examine how active army and army reserve chemical operations specialist Skill Level 1 Soldiers differ in terms of aptitude, job knowledge, job confidence, and perceptions of task difficulty, task importance, task frequency, and task training. No known research effort has been completed to study the differences between these two components with respect to these selected variables.

The research questions investigated in this study were the following:

1. Do aptitude measures of clerical, combat, electronics repair, field artillery, general maintenance, general technical, mechanical maintenance, operators and food, surveillance and communications, and skilled technical as assessed by the Armed Forces Vocational Aptitude Battery composites significantly discriminate between active army and army reserve chemical operations specialist Skill Level 1 soldiers?

2. Do job knowledge, job confidence, and perceptions of task difficulty, task importance, task frequency, and task training significantly discriminate between active army and army reserve chemical operations specialist Skill Level 1 soldiers?

## Method

The subjects for this study were 312 chemical operations specialist Skill Level 1 soldiers of which 154 were active army and 158 were army reserve soldiers. Of the 312 soldiers involved, complete data were obtained on 303. Soldiers were selected from six active army units and nine army reserve units at 12 different locations.

All data collections were conducted personally by the principal researcher at 11 of the 12 locations. Data from the 12th location was collected by a peer who had assisted this researcher during two previous data collections.

Data collection instruments included (a) Chemical Operations Specialist Skill Level 1 Job Knowledge Test with a demographic cover sheet, (b) Chemical Operations Specialist Skill Level 1 Job Confidence Survey, and (c) Chemical Operations Specialist Skill Level 1 Task Survey. Aptitude measures for each soldier were obtained from the Armed Services Vocational Aptitude Battery Scores recorded in each soldier's personnel file.

In order to investigate the research questions of this study, the statistical procedure of discriminant analysis was used to analyze individual scores. For the first research question, the independent variables examined were: (a) clerical, (b) combat, (c) electronics repair, (d) field artillery, (e) general maintenance, (f) mechanical, (g) operators and food, (h) surveillance and communications, and (i) skilled technical. The dependent variable was military classification--active army and army reserve.

For the second research question, the independent variables examined were: (a) job knowledge, (b) job confidence, (c) task difficulty, (d) task importance, (e) task frequency, and (f) task training. Again, military classification--active army and army reserve--was the dependent variable.

## Results

For each research question, the following results were obtained:

Research Question 1: A discriminant analysis procedure, using the obtained discriminant function scores as Set 1 and military classification--active army components and army reserve --as Set 2, indicated that the components do differ from a multivariate perspective.

A canonical correlation was computed to show the strength of the relationship between the discriminant function scores and military classification of active army and army reserve soldiers. The procedure resulted in a canonical correlation of .263.

Correlations between scores on each independent variable and discriminant function scores were computed to determine which of the variables were making the greatest contribution to the discriminant function. The composite variable of combat contributed the most to the discriminant function, .866. Operators and food, .788, was the variable with the second highest contribution followed by surveillance and communications, .776, mechanical maintenance, .752, field artillery, .738, skilled

technical, .586, clerical, .498, electronics repair, .497, general maintenance, .461, and general technical, .428.

Univariate significance tests for the equality of component means indicated a rejection of the hypothesis that these means are not significantly different for each variable. Active army and army reserve chemical operation specialist Skill Level 1 soldiers differed on all 10 variables on the Armed Services Vocational Aptitude Battery with the active army soldiers being higher on all aptitude measures.

Research Question 2: A discriminant analysis procedure, using the obtained discriminant function scores as Set 1 and military classification--active army and army reserve--as Set 2, indicated that the components do differ from a multivariate perspective.

A canonical correlation was computed to show the strength of the relationship between the discriminant function scores and military classification of active army and army reserve soldiers. The procedure resulted in a canonical correlation of .528.

Correlations between scores on each independent variable and discriminant function scores were computed to determine which of the variables were making the greatest contribution to the discriminant function. Task importance was the variable with the highest contribution, .525, to the discriminant function. Task frequency was the variable with the second highest contribution, -.503, followed by job knowledge, -.428, and task difficulty, .363. The variables of task training, -.109, and job confidence, -.016, did not contribute significantly to the discriminant function.

Univariate significance tests for the equality of component means indicated a rejection of the null hypothesis that these means are not significantly different for each variable. Active army and army reserve chemical operations specialist Skill Level 1 soldiers differed on the variables of job knowledge and perceptions of task difficulty, task importance, and task frequency with the active army soldiers being higher on job knowledge and task frequency and army reserve soldiers being higher on task difficulty and task importance. They did not differ significantly on the variables of job confidence and task training.

## Conclusions

The following conclusions were indicated:

1. Active army chemical operations specialist Skill Level 1 soldiers possess more trainability than army reserve chemical operations specialist Skill Level 1 soldier as evidenced by the higher scores on all composites of the armed services Vocational Aptitude Battery. The active army soldiers also scored higher on the Chemical Operations Specialist Skill Level 1 Job Knowledge Test even though they were younger and had less time on the job. This finding supports the research which indicates that people with higher aptitudes have more learning ability and score higher on job performance measures (Armor, 1981; Maier & Hiatt, 1984; Shields, Hanser, Williams, & Popelka, 1981).

2. There were no significant differences between the active army soldiers and the army reserve soldiers on the variables of job confidence or task training. Both components were confident

that they could perform their jobs and perceived that they had received approximately the same amount of training.

3. Army reserve soldiers perceived that the tasks were more important and more difficult than did the active army soldiers. Army reserve soldiers are more focused on mission-essential tasks during the 2 days a month and 2 weeks a year that they perform military duty and thus may perceive the tasks to be more important than do the active army soldiers who perform the tasks daily. The perception of task difficulty may be related to the fact that the army reserve soldiers perform the task infrequently while the active army soldiers perform tasks on a daily basis.

4. Perceptions of task frequency were significantly different with the active army soldier performing the task more often. Frequency of performance may be related to the duty time of 365 days a year for active army versus 2 days a month and 2 weeks a year for army reserve soldiers.

The findings of this study indicate that in the variables tested--aptitude, job knowledge, job confidence, task difficulty, task importance, task frequency, and task training--the active army and army reserve chemical operations specialist Skill Level 1 soldiers are significantly different on all measures except job confidence and task training. Any training approach should be designed for active army and army reserve soldiers as two different populations rather than as a homogenous group.

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